Abstract

Prediction is an important issue in many dynamical systems and is vital for effective management and control of plants.

An important process which has recently derived much attention is the air pollution problem.

Prediction of different air pollution parameters can help in managing a safer city, and identifying the dynamics governing the air pollution behavior can further result in proper control and preventive actions. In this thesis, using real data for Arak city during Oct 2003, the following pollution parameters are analysed:

1. Co (Carbon Monoxide)
2. No (Nitrogen Monoxide)
3. No_2 (Nitrogen Dioxide)
4. O_3 (Ozone)
5. PM_{10} (Particulate Matter)
6. So_2 (Sulfur Dioxide)

This analysis is carried out in two stages:

I) Predictability analysis using Lyapanov Exponent, Corrolation Dimension and Rescaled Range Analysis (R/S).

II) Prediction using Classical Methods (Auto Regrassive) and Neural Networks (Multi layer perceptron, Time delay line, Gamma).

Also, a comparative study is performed using the different methods employed and prediction results are provided to show the effectiveness of the predictions.